

REMARKS

Applicants hereby request further consideration of the application in view of the amendments above and the comments that follow.

Status of the Claims

Claims 1-7 are pending in the present application. Claims 1-7 stand rejected under Section 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which application regards as the invention. Claims 1 and 2 stand rejected under Section 102(e) as being anticipated by European Application No. 0956376 to Kordina (Kordina). Claims 5-7 stand rejected under Section 102(e) as being anticipated by U.S. Patent No. 6,406,983 to Hölzlein (Hölzlein). Claim 3 stands rejected under Section 103(a) as being unpatentable over Kordina in view of U.S. Patent No. 6,331,212 to Mezey (Meyez). Claim 4 stands rejected under Section 103(a) as being unpatentable over Mezey in view of Japanese Patent No. 01027225 to Kuramata (Kuramata).

The Objections to the Specification

The title and the abstract have been amended to address the objections thereto.

The Rejection under Section 112

The Action states that the use of the term "susceptor" in Applicants' claims is unclear because "the definition of a susceptor used for examining chemical vapor deposition assemblies is, a member that directly supports the substrate." (Action at pages 2-3). Applicants respectfully submit that the definition of "susceptor" proposed by the Action is unduly narrow and those of ordinary skill in the art would understand an inductively heated member surrounding a chamber, but not directly supporting a substrate, to be a "susceptor" (see, for example, paragraph [0001] of European Application No. 0956376 to Kordina, which is cited by the Action). In particular, it is clear from Applicants' specification that a susceptor as claimed may refer to such a structure. Applicants therefore request withdrawal of the rejection under Section 112.

The Rejections under Sections 102 and 103

Claims 1 and 2:

Claim 1 stands rejected under Section 102 over Kordina. Claim 1 recites, *inter alia*:

c) wherein the liner is removable from the susceptor without requiring disassembly of the susceptor.

The provision of a liner that is removable from the susceptor without requiring disassembly of the susceptor as claimed may allow for reductions in cost of use and downtime. The liner may be cost-effectively and efficiently removed for replacement or cleaning (*e.g.*, to scrape away parasitic deposits) without requiring replacement or disassembly of the susceptor. Moreover, the liner may be removed without requiring removal of the housing assembly from a reactor assembly or disassembly of the remainder of the housing assembly.

By contrast, the plates 16, 17 of Kordina are sandwiched between the top and bottom wall pieces 13, 14 and the lateral wall pieces 11, 12 such that the susceptor wall pieces 11, 12, 13, 14 must be disassembled to remove the plates 16, 17. *See*, Kordina at paragraph [0020]. It is not apparent how the Kordina apparatus might be modified to satisfy the recitations of Claim 1. To the contrary, it is likely that any modification to Kordina that would allow the plates 16, 17 to be removed from the wall pieces 11-14 without disassembly would destroy, at least in part, the functionality of the Kordina apparatus. The plates 16, 17 are deliberately inserted between the side wall pieces 11, 12 and the top wall piece 13 and between the side wall pieces 11, 12 and the bottom wall piece 14 to prevent etching of the SiC-coating and the walls of the susceptor close to the edges of the SiC plates (*see, e.g.*, Kordina at paragraphs [0010] and [0021]).

Accordingly, Claim 1 is clearly distinguishable from Kordina. Claim 2 depends from Claim 1 and is therefore allowable for at least these reasons.

Claims 3 and 8-10:

Claim 3 recites:

3. A housing assembly for an induction heating device, the housing assembly defining a processing chamber and comprising:
 - a) a susceptor surrounding at least a portion of the processing chamber; and
 - b) a thermally conductive liner interposed between the susceptor and the processing chamber, wherein the liner is separately formed from the susceptor;
 - c) wherein the susceptor includes a platter region, the housing assembly further including:
 - a platter adapted to support the article disposed in the processing chamber and overlying the platter region; and
 - an opening defined in the liner and overlying the platter region.

By way of example, in the embodiment described in Applicants' specification, the bottom liner **150** defines an opening **156**. The opening **156** overlies and exposes a platter region **112** on the bottom susceptor member **110**. A platter **140** is received in the opening **156** and directly overlies the platter region **112** of the bottom susceptor member **110** without a portion of the liner **150** being interposed therebetween. In this manner, the internal surfaces of the housing assembly **100** (*i.e.*, the surfaces in fluid communication with the passage **102**) are maintained at a more spatially uniform temperature so that the thermal gradients in the vicinity of the substrate are reduced. Restated, a more isothermal environment may be created in the passage **102** for the substrate **5** such that the temperature of the portion of the housing assembly **100** in contact with the substrate **5** (*i.e.*, the platter **140**) is at substantially the same temperature as the other surfaces defining the passage **102** (*i.e.*, the interior surfaces of the liners **150**, **160** and the side susceptor members **130**). The substrate **5** may therefore itself be substantially the same temperature as the surfaces defining the passage **102**. As a result, the problems mentioned in Applicants' specification associated with undesirably large thermal gradients may be reduced. For example, the formation of loose deposits may be eliminated or reduced. The process (*e.g.*, an epitaxy process) may be more accurately controlled.

The Action contends that it would have been obvious "to form Kordina's assembly including an opening defined in the susceptor [sic¹] interposed between the platter region and the platter in view of the teaching of Mezey." However, Kordina does not suggest the provision of either a platter as claimed or an opening as claimed in either the plate 16 or the plate 17. Mezey, does not disclose a liner as claimed including an opening. Thus, neither reference provides any apparent suggestion of the proposed modification to Kordina. Even if, *arguendo*, the ordinarily skilled artisan were to modify Kordina to address the problem proposed by the Action, there is no apparent reason why said artisan would form an opening in the plate 16 as claimed rather than simply a recess in the plate 16. To the contrary, at col. 7, lines 37-46, Kordina states:

This means no severe etching due to so called hot spots, and the fact that the SiC-plates cover the entire bottom and ceiling of the susceptor channel 1 and that they are inserted between the bottom and top wall piece and the latter wall pieces means that the edges of the SiC-plates are hidden outside the susceptor channel, so that the problem of severe etching close thereto will be eliminated. Thus, the lifetime of the susceptor may be prolonged with respect to susceptors already known.

Thus, Kordina teaches away from the proposed modification.

Accordingly, Claim 3 is clearly distinguishable from Kordina. Claim 8 depends from Claim 3 and is therefore allowable for at least these reasons. Claim 8 depends from Claim 3 and is therefore allowable for at least these reasons.

Claims 4 and 11:

Claim 4 recites:

4. A housing assembly for an induction heating device, the housing assembly defining a processing chamber and comprising:
 - a) a susceptor surrounding at least a portion of the processing chamber; and

¹ Applicants believe the Action intended to refer to the "liner" rather than the "susceptor".

- b) a thermally conductive liner interposed between the susceptor and the processing chamber, wherein the liner is separately formed from the susceptor;
- c) wherein the liner varies in thickness along at least a portion of its length.

The Action acknowledges that Mezey does not disclose a liner having a variable thickness. However, the Action contends that it would have been obvious to form the velocity gradient plate **150** of Mezey to have a varied thickness along at least a portion of its length in view of Kuramata in order to increase the velocity of the gas. However, Applicants respectfully note that this suggested reason does not provide any motivation - that is, the sloped mounting arrangement of the velocity gradient plate **150** solves the problem identified by the Action. Thus, there is no teaching, suggestion or motivation apparent from the references or otherwise for forming the plate **150** with a varied thickness. By contrast, a liner as claimed by Applicants may serve to desirably control the flow of process gas while also providing a more spatially uniform temperature distribution as discussed above.

Additionally, as best understood, the process chamber **54** of Mezey is not a susceptor. Rather, the process chamber **54** is intended to be heated by heating elements **66** such as electrical powered heating elements (*see, e.g.*, Mezey at col. 5, lines 27-45).

In view of the foregoing, Applicants submit that Claim 4 is patentable over the cited art. Claim 11 depends from Claim 4 and is therefore allowable for at least the foregoing reasons. Claim 11 further recites that the liner contacts the susceptor. By contrast, the plate **150** of Mezey is spaced apart from the wall of the process chamber **54**.

Claims 5-7 and 12:

Claim 5 as amended recites:

- 5. A housing assembly for an induction heating device, the housing assembly defining a processing chamber and comprising:
 - a) a susceptor surrounding at least a portion of the processing chamber; and

- b) a thermally conductive liner interposed between the susceptor and the processing chamber, wherein the liner is separately formed from the susceptor;
- c) wherein the susceptor includes a susceptor core of a first material and a susceptor coating of a second material; and
- d) wherein the second material is selected from the group consisting of refractory metal carbides; and
- e) wherein the liner is interposed between the susceptor coating and the processing chamber.

The Action contends that, in the Holzlein apparatus, the container 13 corresponds to the claimed susceptor, the baseplate 17 corresponds to the claimed liner, the outer container layer 21 corresponds to the claimed core, and the inner layer or coating 20 corresponds to the claimed coating. However, Claim 5 as amended is directed to a housing assembly for an induction heating device wherein the susceptor includes a core that is coated with a material selected from the group consisting of refractory metal carbides (*e.g.*, TaC), and a liner is interposed between the susceptor coating and the processing chamber. In contrast, the baseplate 17 of Holzlein is located between the outer container layer 21 and the coating 20, not between the coating 20 and the processing chamber. Thus, Holzlein does not suggest the use of a coating of a refractory metal carbide on a susceptor core, wherein a liner is interposed between the coating and a processing chamber.

Nor would it have been obvious to the ordinarily skilled artisan to modify the Holzlein apparatus to position the baseplate 17 between the coating 20 and the processing chamber. By design, the coating 20 of Holzlein interfaces with the gas stream. *See, e.g.*, Holzlein at col. 7, lines 39-48 and lines 60-64. Thus, Holzlein teaches nothing with respect to materials for use in coating a susceptor core separated from a processing chamber by a liner.

In view of the foregoing, Applicants submit that Claim 5 as amended is patentable over the cited art. Claims 6, 7 and 12 depend from Claim 5 and are therefore allowable for at least the foregoing reasons. New Claim 12 further recites that "the liner includes a portion formed of SiC interfacing with the processing chamber", and is thereby further distinguishable from Holzlein which, as best understood, teaches away from such a construction.

In re: Sumakeris et al.
Serial No.: 10/714,214
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CONCLUSION

Applicants respectfully submit that this application is now in condition for allowance, which action is requested. Should the Examiner have any matters outstanding of resolution, he is encouraged to telephone the undersigned at 919-854-1400 for expeditious handling.

Respectfully submitted,

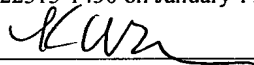


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